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Spin-wave eigen-modes in a normally magnetized nano-pillar

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Abstract

We report on a spectroscopic study of the spin-wave eigen-modes in a circular spin-valve nano-pillar, perpendicularly magnetized along $\hat{z}$. Spectroscopy is performed by Magnetic Resonance Force Microscopy (MRFM). Distinct spectra are measured depending on whether the nano-pillar is excited by a uniform in-plane radio-frequency (RF) magnetic field or by an RF current flowing perpendicularly through the layers. These results are in agreement with micromagnetic simulations of the time decay response of the local magnetization to excitations with different azimuthal symmetries, $(\hat{x} + i\hat{y})e^{-il\varphi}$. This demonstrates that the azimuthal l-index is the discriminating parameter for the selection rules, as only $l = 0$ modes are excited by the RF magnetic field, whereas only $l = +1$ modes are excited by the RF current, owing to the orthoradial symmetry of the induced RF Oersted field. © Springer-Verlag Berlin Heidelberg 2013.

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